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The AMERICAN JOURNAL of OPTOMETRY

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AMERICAN JOURNAL OF OPTOMETRY

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VITAMINS IN EYE-WORK*

John C. Neill, Opt.D., F.A.A.O.
Philadelphia, Pa.

During the last decade there have been recorded tremendous advances in the knowledge of vitamin deficiencies and their therapy. The close relation between various ocular manifestations and certain of the avitaminoses has suggested that a review of the literature on this subject would be of interest to optometrists.

To properly approach this problem and to show the place of vitamin therapy in use today requires that we review briefly the earlier history of the various factors. It will only be possible, however, in an article such as this, to trace in outline the years of labor and the devious reasoning which led, step by step, to the establishment of the existence of the group of accessory food factors known as vitamins.

The activity of the physiologists and chemists during the 19th century consisted only in the separation of the living matter of animal or plant into its larger components of proteins and carbohydrates. It was known that the proteins were essential for growth and for replacing tissue and that the carbohydrates were providers of heat and energy. At that time it was considered that the subject of nutrition offered little scope for new discoveries.

At the beginning of the present century investigations were initiated by means of new experimental methods. As a result of these newer methods we see the advent of a new era in the knowledge of the nutritive needs of the body and of the essential characteristics of foods. It became evident that a diet could be sufficient and of proper chemical proportion and still fail to meet the full needs of nutrition. It had, of course, been

*An abridgment of the material appearing in the August and September issues of the Alumni and Extra-Mural Bulletin of the Pennsylvania State College of Optometry. 1938.

known for centuries that certain preserved foods produced scurvy among sailors, soldiers and the inmates of prisons. It was also well known that the addition of fresh fruits or certain vegetables to the diet would cure the condition and protect against its occurrence. But no one, until modern times, attempted to investigate by experiment the reason why certain diets, otherwise full, should induce disease and why certain foods protected against such conditions, even when constituting only a fraction of the total diet.

Lunin in 1880 discovered that an unknown factor necessary for growth in animals, was lacking in a synthetic milk diet. This might be said to be the starting point in the revival of interest in the problem of nutrition. In 1897, Eijkman, stimulated by the success of Takaki in 1882 in eradicating beri-beri from the Japanese navy by the introduction of an improved mixed diet, made the first tentative experiment when he fed pigeons on a diet restricted to milled or polished rice and found that they developed a condition of paralysis (polyneuritis) strikingly like beri-beri in man. He suggested that there was something in the bran layer which protected against this pathological condition.

In 1901, Grijns confirmed Eijkman's findings of the presence of this anti-neuritic substance in rice husks and beans. In 1911 Fraser and Stanton successfully treated experimental polyneuritis with an alcoholic extract of rice polishings. In the same year Funk called attention to these and other experiments which indicated the existence of an indefinite group of substances in food which were indispensable to complete health and he suggested the word "Vitamine" to denote the missing necessary factor in the polished rice production of beri-beri. He attempted to isolate this missing factor from the pericarp and postulated vitamin deficiency for beri-beri, scurvy, pellagra and rickets. This led to a widespread investigation into the results of feeding laboratory animals on diets of various types.

In 1912 Hopkins published the results of a long investigation carried out over a number of years which gave conclusive experimental proof of the existence of unknown and indispensable substances in diet. He demonstrated that laboratory animals could not live on a purified well-balanced diet of correct energy value unless small quantities of milk were added each day; thus confirming the earlier work of Lunin. Hopkins termed the necessary dietary substances "accessory food factors." Even as early as 1906 he had written with reference to possible missing nutritive

principles in diet, but it was the publication of his work in 1912 that marked the beginning of a full and proper appreciation of these dietary factors which we now know as "vitamins."

Following Stepp's experimental evidence in 1909 of the existence of some indispensable dietary unit associated with lipoids, McCollum, Davies and Kennedy, from 1913 to 1916, accumulated data to show that butter-fat, dissolved out with ether, secured prolonged growth in animals when added to diets which would not otherwise support growth. Egg-yolk fat was found to have the same property, but the addition of lard and olive oil to the same diet resulted in little growth and early failure. Fat soluble vitamin A associated with certain fats was thus first recognized. It was realized, however, that there was not one but a series of essential dietary principles. Further researches by many workers have been directed to the identification and isolation of the accessory food factors.

The recognition of vitamin A was followed by the identification of water soluble vitamin B, never associated with fats, but widely distributed in vegetable foods. Evidence continued to accumulate to show the existence of a third factor necessary to the life of certain animals. Holst and Frölich in 1913 suggested water soluble vitamin C as the factor missing in diets producing scurvy. Hess (1914-18) showed it to be abundant in citrus fruits and tomatoes.

Research in the direction of the relation between bone growth in the young and diet established the identity of vitamin D which is generally associated with vitamin A. Experimental rickets, by dietary deficiency, was produced in puppies by Findlay in 1908 and in rats by McCollum and Simmonds in 1917. It was not until 1919 that Mellanby demonstrated the marked improvement in such cases following the administration of cod liver oil. The effects of cod liver oil on the deposition of calcium on the bones and the increase of phosphorous in the blood was demonstrated by Howland and Park in 1920. A fat soluble vitamin E, which is said to be necessary for reproduction in certain animals, was recognized by Evans and Bishop in 1923.

Studies are now being directed toward the elucidation of the chemical structure and nature of the vitamins and their isolation and concentration in a free state apart from the association in which they naturally occur. Considerable progress has already been made in this

direction but the complexity of vitamin B and the possibly dual nature of vitamin D indicate that much work has yet to be done.

An important biological generalization has become evident, however, and that is the fundamental one that animals are themselves unable to synthetize vitamins and are thus dependent for their vitamin supply on the contents of their diet. The vitamins stored in the tissues or available for use in any animal are supplied directly and in quantitative proportion by the diet of that animal.

Vitamin A

Research with vitamin A led to the discovery of its parent substance "carotene," a yellow pigment found in many foodstuffs. It is especially abundant in carrots, hence its name, but it is also widely distributed throughout the vegetable kingdom. The relation between vitamin A and the carotinoid pigments was only revealed when investigations offered evidence of the vitamin A activity of carotene. Since this discovery established that carotene exhibits the characteristic physiological properties of vitamin A, it has been adopted as the international standard for vitamin A.[1]

Carotene is a member of a group of pigments known as lipochromes, which are present in many fats. It is responsible for the color of carrots and is present in the following vegetables and fruits:[2]

Excellent Sources

Apricots	Collards	Kale	Spinach
Broccoli	Dandelions	Parsley	Sweet Potatoes
Carrots	Escarole	Peppers	Turnip Greens
Chard			

Good Sources

Asparagus	Celery (green)	Peaches	Soy Beans
Bananas	Cress	Peas (green)	Squash
Beans (green)	Lettuce	Plantain	Tomatoes
Cabbage	Mangoes	Prunes	Watermelon
Cantaloupe	Oranges		

It is also found in egg-yolk, milk and butter having been derived from vegetable foodstuffs. Excess of carotene given to an animal is stored not as carotene but as vitamin A. The pigment carotene is, therefore, the precursor of vitamin A. It is, in fact, sometimes called "provitamin A." It seems that vitamin A is represented in the plant kingdom by carotene, but that the vitamin A of the animal kingdom is an uncolored

substance differing slightly from carotene yet having the same physiological characteristics. The ultimate source of vitamins, therefore, is seen to be in the chlorophyl containing plants, in which it seems that the process of photosynthesis is accompanied by the production of vitamins.

The more highly differentiated forms of animal life are not dependent on light for the functioning of their fundamental processes of metabolism, although light can still affect some of their cells. Such higher forms of life have become dependent upon a series of chemical substances for the formation of which light is necessary. Marine animals are no less dependent on this source than are land animals. The vast supply of microscopic algae and diatoms possessing photo-catalytic pigments form the source of food and vitamin supply for the larger animals such as the copepods and other entomostraca. These latter form the food for the young and smaller fish and these, in turn, the food for larger fish. The ultimate source, therefore, of the vitamins contained in certain fish oils, such as cod liver oil, is represented by the free floating microscopic plants on the ocean surface.

One of the most important results of work in connection with vitamin A is the conclusion that changes in the epithelial cells may result from deficiency of this vitamin and that consequently during the period of growth it is the chief factor concerned in the proper development, maintenance and repair of epithelial structures. This tissue is the first line of defense of the body against any irritating foreign substances, and, therefore, in all cases in which the ocular, auditory, respiratory, digestive, absorptive, excretory, genital or dermal organs are involved, the condition of the epithelial tissue must be considered to be of primary importance. Whenever this type of tissue is faulty for any reason, vitamin A therapy may be indicated. Among the conditions which have been reported as benefited by vitamin A therapy may be mentioned: pyorrhea alveolaris, keratomalacia, demyelination of the spinal cord and other degenerative diseases of the central nervous system, hemeralopia, photophobia and respiratory diseases.

Wolbach[3] gives the pathologic sequence of epithelia changes resulting from vitamin A deficiency as atrophy of the epithelium concerned and the substitution for it of a stratified keratinizing epithelium, identical in appearance in all locations, and arising from focal proliferation of basal cells. He terms this change as a result of vitamin A deficiency "keratinizing metaplasia," and states that the absence of vitamin A creates a starvation

specific for many epitheliums, the consequence of which is atrophy, progressing to a state wherein the cells, although having the appearance of viability, become inert in physiologic activities and in their role of covering membranes. An invariable sequence in pathology is that a break in continuity of a tissue is followed by reparative proliferation. In vitamin A deficiency the basal cells normally concerned in maintaining the integrity of epithelium respond by active mitotic division. As the basal cells have a focal distribution in all non-stratified epitheliums, the next effect of the deficiency after atrophy is the appearance of scattered areas of proliferative activity beneath the original epithelium. The new reparative cells by their continued growth undermine and replace the original epithelium and, regardless of previous function and morphology of the region, develop into a stratified keratinizing epithelium.

The lesions of vitamin A deficiency, uncomplicated by destruction of tissue by infectious processes, disappear rapidly after restoration of diet. The initial changes are separation of superficial keratinized cells and vacuolization of cells of intermediate layers. The epithelium becomes divided into two zones by further vacuolar degeneration and luekocytic infiltrations. The superficial zone of cells degenerate, the deep zone, consisting of the lowermost layers of cells corresponding to the stratum genminativum of the epidermis, survives and the cells proceed to differentiate into the type of epithelium originally present. On the whole the change back to normal epithelium is an abrupt one and affords evidence that the primary consequence of vitamin A deficiency is of epithelial origin.

According to Jeans, Blanchard and Zentmire[4] adaptation of the normal eye to darkness depends on the ability to regenerate visual purple, which in turn is related to the presence in the retina of vitamin A or a closely related substance. Consequently, any test that shows relative or absolute capacity for dark adaptation becomes a test for vitamin A deficiency in those with potentially normal eyes. This fact is readily demonstrated by the administration of vitamin A or carotene to those with poor adaptation and no gross uncorrected visual defect.

While night blindness was known to the ancients and raw goat's liver recognized as its remedy it was not until 1864 that Bitot described the syndrome of xerophthalmia with exactitude. Scullica[5] studied the history of the vitamin relationship with hepatic secretions and reformation of the visual purple. He reports in detail eleven cases of xerophthalmia with hemeralopia which he attributes to disturbed metabolic equilibrium. This is more marked in children, in whom the hormones have

not yet arrived at their full functional power, either in the endocrine or the exocrine glands. Avitaminosis causes intolerance of fats and a vicious circle results in which keratomalacia is but one symptom.

Jeghers[6] emphasizes the rarity of the fully developed classic vitamin deficiency diseases and points to the frequency of milder deficiencies stating that this is particularly true with regard to vitamin A deficiency. He states, as a result of his observations on a group of medical students, that 35 per cent had low photometric readings while only 12 per cent had clinical manifestations of the deficiency. The chief manifestations, in the order of their frequency, were night blindness, photophobia, dry skin, dry conjunctivae, blepharitis and follicular hyperkeratosis. He analyzed the factors producing the deficiencies and showed that the skipping of meals and poor choice of foods were chiefly responsible. After dietary analyses he concludes that 4,000 international units of vitamin A daily represent the minimal requirement for a healthy adult. Infections were more numerous and more severe among the deficient students. Further evidence that it is dangerous for the hemeralope to drive at night was obtained. Photometric evidence of night blindness appeared in six days and subjective evidence in five weeks after the production of a pure vitamin A deficiency in an experimental subject. Night blindness always preceded gross epithelial changes.

Vitamins A and C are the most important from an ophthalmic viewpoint according to Viallefont and Diacono.[7] Avitaminosis A reveals itself as a conjunctival xerosis or keratomalacia and hemeralopia. Hemeralopia may not be accompanied by any objective sign, but may reveal itself as a constriction of the visual field for green and especially for red. Biomicroscopy will often reveal early changes in the corneal epithelium. Under the name of paravitaminosis they group certain manifestations which are cured or relieved by vitamin therapy. Torpid trophic keratitis, phlyctenular kerato-conjunctivitis and other slowly healing corneal lesions have yielded to local vitamin A therapy.

Rice,[8] et al, studied thirty patients with trachoma for varying periods to determine the effect of diet and vitamins on the disease and came to the conclusion that there is no evidence that a balanced diet supplemented with cod liver oil affected the course of trachoma in the untreated eyes of eighteen patients kept under observation. Neither was there evidence that a balanced diet supplemented by cod liver oil, both by mouth and intramuscularly, and Brewer's yeast affected the course of the disease

in twelve trachomatous patients during the time they were kept under observation.

Rinaldi[9] reports twenty patients with corneal disease including dystrophic, disciform and phlyctenular keratitis being treated with vitamins A and D locally. In seventeen cases rapid healing followed institution of the treatment. He concludes that the local use of the vitamins is of value in the treatment of keratitis of these types.

Heinsius[10] tested the action of cod liver oil and vitamin A which it contains on a series of rabbit's eyes after producing abrasions of the cornea. He found that on local application they had a definite accelerating effect on the regeneration of the corneal epithelium, thereby confirming the clinical results of the treatment of wounds by these agents. He also found that there was no material difference in the action of cod liver oil from that of vitamin A by itself, from which it can be inferred that this vitamin was the sole factor in cod liver oil that has this effect on the formation of new epithelium. This vitamin probably supplies the material necessary for the rebuilding of the cells—possibly the purines that favor the formation of cell nuclei.

[11]Yudkin, Orten and Smith report having observed sixteen cases of keratitis during the last four years, in which the etiology was not obvious. Histories indicated that the condition was accompanied by loss of appetite, constipation, headache and general malaise. Invariably these patients had lost their teeth early in adult life. The ages ranged from 45 to 68 years. The first complaint was of having something in the eye and photophobia. Treatment of this type of corneal lesion has been very unsatisfactory; local medication and heat seemed to aggravate and delay the healing process producing a refractory condition. A number of these patients were given cod liver oil in addition to their regular diet. Some showed improvement in a short period of time, whereas others did not respond. From the history it appeared the intestinal tract might be at fault. The patients were then given large quantities of vitamin B complex before each meal in addition to the cod liver oil. In a large proportion of these cases the systemic and ocular disturbances disappeared. The authors conclude that some ulcers of the cornea may not respond to vitamin A alone, but will respond when vitamin B complex is administered.

[12]Heinsius has used Vogan ointment (2%) in the University of Berlin Eye Clinics in treating recurrent corneal erosions, keratitis bullosa, keratitis neuroparalytica and scrofulous keratoconjunctivitis. This

ointment corresponds in vitamin A content to good cod liver oil and the results when used two or three times daily in these conditions were gratifying.

[13]Jeghers states that a vitamin A deficiency may occur if any condition is present which increases metabolism for vitamin A, such as fever, infection, increased basal metabolic rate, or pregnancy; or which interferes with conversion of carotene or storage of vitamin A in the liver. Vitamin A deficiency is a constant feature of liver disease and does not correct itself by the usual oral doses of vitamin A.

[14]Fai has used with good results over a thousand hypodermic injections of carotene for phlyctenular conjunctivitis, keratoconjunctivitis, hordeolum, pigmentation, dryness and puffiness of the skin of the eyelid, xerophthalmia and night blindness. For babies under two years he used 0.5 c.c. once, for children under 10 years 1 c.c. repeated once three days later, and for children over ten years and adults 1 c.c. repeated for three doses. The only contraindication was cirrhosis of the liver.

Strebel reports the case of an infant of five months suffering from itching eczema so that it could not sleep. The child was placed on a fat free diet. Two months later it was free from eczema but showed a wrinkled skin with diminished turgor and with corneal xerosis. In the foamy secretion at the angles of the lids numerous xerosis bacilli were found. The sensibility of the cornea was diminished and tension slightly decreased. Under fat milk, vogan and carrot juice the skin turgor soon became normal and the cornea clear, but the allergic eczema returned in moderate form, so that fat-free milk had to be given. The vogan was discontinued, but the carrot juice was continued. This rapid cure of xerophthalmia was so striking that Strebel now treats corneal affections of protracted course with vitamin A.

[15]Federici removed a superficial disc of corneal tissue from the eyes of several rabbits and instilled drops of common cod liver oil in the conjunctival sac. Some irritation of the conjunctiva followed but the process of repair was more rapid and the scar tissue less visible than in the control eye. If refined neutral cod liver oil was used in one eye and an oily vehicle containing the same amount of vitamin A and D in the control eye the results were equal, but far better than those obtained by the use of ordinary antiseptic eye ointments. He concludes that in view of the antibacterial action of cod liver oil, its use in collyrium or as a 10 to 50 per cent ointment is to be preferred to other means.

Summarizing all of the present-day knowledge of vitamin A the Council on Pharmacy and Chemistry and the Council on Foods of the American Medical Association[16] have issued the following statement: "Evidence for the existence of vitamin A and its role in human nutrition is based on the fact that a characteristic eye disease, usually called xerophthalmia, results from a deficiency of this vitamin.

"It is generally agreed that the first symptoms or at least one of the first clinical symptoms of vitamin A deficiency is night blindness, or nyctalopia. For this type of night blindness vitamin A is a specific. Cases of nyctalopia exist which do not respond to treatment with vitamin A. These may be due to congenital defects or to other diseases than avitaminosis A.

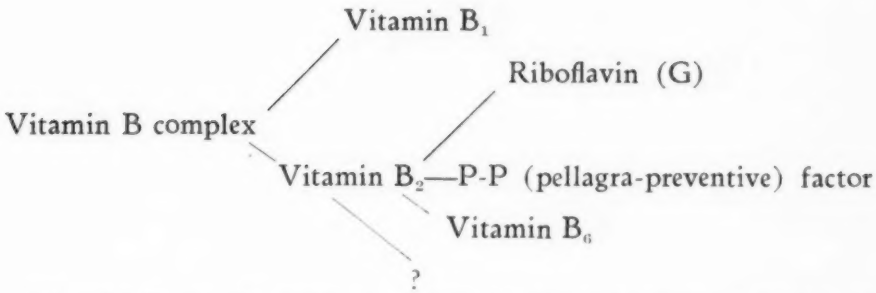
"Present indications are that vitamin A is an aid toward the establishing of resistance of the body to infections in general only when there has been an exhaustion of body reserves of the vitamin and the ingestion of vitamin A is inadequate. It certainly has not been shown to be specific in the prevention of colds, influenza and such infections, nor has it been demonstrated that ingestion of vitamin A far in excess of that necessary for normal body function and readily obtained from a properly selected diet is an aid in preventing various types of infections.

"A deficiency of vitamin A results in retardation of growth when body stores of the vitamin have been depleted, but it must be borne in mind that vitamin A is no more important in contributing to normal growth than any one of the other vitamins, the essential mineral elements, or amino acids. Statements conveying the impression that vitamin A is more important in promoting growth than other food essentials are therefore considered misleading and objectionable.

"There is at the present time inadequate evidence to warrant the claim that the ingestion of sufficient vitamin A will prevent the formation of renal calculi in man."

Vitamin B

It has recently been recognized that vitamin B can be subdivided into at least six factors, all of which are to be found in fresh yeast. These factors are associated in nature and have similar chemical properties, but the most important fractions are vitamin B_1, which is essential for growth and protective against polyneuritis, and vitamin B_2, the pellagra-preventing vitamin, also known as vitamin G. Harrow[17] summarizes the present vitamin B situation graphically, thus:



Vitamin B_1 or Thiamin is known as the antineuritic vitamin. It is water soluble and is never associated with fats. It is essential for normal condition and functioning of nerve tissue: it promotes growth, stimulates appetite, aids digestion and assimilation, and is related to carbohydrate and fat metabolism. Mild symptoms of deficiency are noted by weakness, poor appetite, digestive disturbances, slow heartbeat, retarded growth, nervousness, decreased peristalsis, poor assimilation, poor lactation and glandular dysfunction. Extreme deficiency produces beri-beri, polyneuritis, paralysis, atrophy of glands, loss in weight, intestinal infections, convulsions, gastric atony, head retraction and atrophy of musculature.

(It should always be remembered that the positive effects of vitamins are active only up to certain limits. If a vitamin essential for normal growth is increased above an optimum level, the growth response cannot exceed a definite maximum. However, it is expressive to use such terms as "promote growth," "Increases life span," etc., while recognizing the limitations.)

Vitamin B_1 is distributed in the following foods:

Excellent Sources

Asparagus	Buckwheat	Liver	Pork (lean)
Avocado	Grains (whole	Peanuts	Soy Beans
Beans (dried)	or embryo)	Peas	Spinach
Bran	Hazlenuts	Peppers	Yeast

Good Sources

Almonds	Cauliflower	Oranges	Celery
Apricots	Eggs	Pineapple	Prunes
Apples	Grapefruit		
Berries	Green Beans	Carrots	Tomatoes
Cabbage	Milk	Cantaloupe	Turnips

The Council of Pharmacy and Chemistry and the Council on Foods of the A. M. A.[16] have this to say on vitamin B_1:

"Vitamin B_1 is of value in correcting and preventing beri-beri. The

consensus of the students of beri-beri is that this disease is due primarily to an insufficient supply of vitamin B_1. There are conditions which probably could be designated as 'latent beri-beri'; it does not seem wise at this time to attempt the formulation of a definite statement covering such conditions other than as presented in the concluding paragraph of this report.

"Vitamin B_1 may be cited as of value in correcting and preventing anorexia of dietary origin in certain cases. There are many causes of anorexia, some referable to infections and the reactions thereto, others to organic disorders, and still others to faulty diet. Where there is no rather obvious cause of anorexia in question, other than a possible dietary one, it is permissible to claim that vitamin B_1 may be of therapeutic value when the condition to be treated is due to a deficiency of that vitamin.

Vitamin B_1 is of value in securing optimal growth of infants and children. Citations in the literature support the claim that a sub-optimal supply of vitamin B_1 results in limitation of growth.

"Because vitamin B_1 is a dietary essential its administration in concentrated form is of value in some conditions in which difficulty in utilizing ordinary foods in the usual way is encountered.

"The present status of research on the clinical use of vitamin B_1 for specific diseases other than beri-beri and for infant feeding is such that definite claims for therapeutic value in relation to such diseases cannot be recognized. Its use may be indicated, however, in such restricted conditions as pernicious vomiting of pregnancy, tube feedings through a jejunal fistula, and the like, because the above permitted statement applies to such conditions and gives an intelligent basis for such therapy.

"Claims for concentrates of vitamin B_1 offered for clinical use should state the potency in terms of the international unit. The term 'concentrate' or a synonym will not be recognized if the product does not exceed a potency of 25 International units per gram, or if it is a natural product which may have been subjected to a process of dehydration.

"In connection with medicinal foods acceptable for N. N. R. the claim that a food is valuable because of its vitamin B_1 content may be made only if it provides in the quantity of food consumed daily at least 200 units of vitamin B_1. Any good preparation having less than such an amount cannot be regarded as noteworthy medicinal source of the vita-

min. In the light of present knowledge the daily requirement for vitamin B_1 appears to be not less than 50 International units for the infant and 200 International units for the adult.

"There are many experimental indications in the literature suggesting other possible functions of vitamin B_1, e. g., an influence on intestinal motility and neuritis of various types, also indications of greatly augmented requirements when metabolism is increased as in hyperthyroidism, neutritis of various types, or infections. It seems too early to permit advertising claims for these conditions."

Nitzulescu and Triandaf[18] report two cases of herpetic keratitis, one incipient and the other of a duration of one month, both treated by parenteral injection of vitamin B_1. In each case there was a rapid amelioration of pain and the treatment seemed to stop the progress of the local lesions, greatly accelerating their cure. They recommend the treatment of all cases of painful and neurogenic affections of the cornea with vitamin B_1.

Vorhaus[19] recommends the use of vitamin B_1, 2,000 International units, daily in the treatment of herpes zoster. In mild cases he reports modification of the postherpetic sequelae in from three to four weeks. In severe cases and in those in which the postherpetic pains have lasted for three months or more, he suggests treatment should be continued for eight weeks or longer.

Yudkin[20] and Carrol[21] have used vitamin B to treat patients suffering from toxic amblyopia due to alcohol and tobacco. During the treatment the patients were allowed to smoke and drink moderately. In those cases where the optic nerve was not atrophied the results were excellent. It is believed that alcohol creates a deficiency disease when taken over a long time by destroying digestive enzymes and thus preventing the digestion and assimilation of food.

Vitamin B_2 (G)

Vitamin B_2 or vitamin G as it is more commonly known, is the anti-pellagric and anti-dermatitis vitamin. It is believed to promote or improve growth and general health, to prolong the active life span and to be essential to nerve tissues and in the respiration of cells. Vitamin B_2 has been shown to contain a flavin substance riboflavin (hepatoflavin, ovoflavin, lactoflavin) and two or more non-flavin factors. All are essential for growth and sustained health. The non-flavin components comprise the rat and chick antidermatitis factors, and the anti-black

tongue factor for dogs.

Mild symptoms of deficiency are marked by digestive disturbances, impaired growth, lack of vigor, shortened life span, poor lactation and impairment of tissue respiration. Extreme symptoms of deficiency are marked by pellagra, dermatitis, weakness, breakdown of central nervous system, cataract, loss of hair, ulceration of the tongue, loss of body weight in intestines, and atony. Pellagra is due to a deficiency of two or more heat-stable factors other than riboflavin. Cataract is believed due to the riboflavin factor.

Vitamin B_2 is distributed in the followings foods:[2]

Excellent Sources

Beet Tops	Heart	Milk	Turnip Tops
Broccoli	Kale	Peanuts	Yeast
Cheese	Kidney	Prunes (dried)	Wheat Germ
Eggs	Liver	Soy Beans	

Good Sources

Asparagus	Cabbage	Escarole	Salmon
Avocados	Carrots (and tops)	Ice Cream	Spinach
Bananas	Cauliflower	Lettuce	Tomatoes
Beef	Cress	Pears	Collards
Beets (and tops)	Veal	Peas (dried)	Turnips
Broccoli			

Vitamin B_3 is a thermolabile, growth essential factor for pigeons. Vitamin B_4 is a growth essential, heat labile factor for rats. Vitamin B_6 is sometimes used to represent an anti-dermatitis factor in the older B_2. Vitamin F has been proposed to represent either the essential unsaturated fatty acids or one of the fractions of the "B complex."

Wagner and Weir[22] report several cases of vomiting of pregnancy associated with acute optic neuritis, hemorrhages in the retina, paralyses of ocular muscles and nystagmus which they believe to have been caused by dietary or nutritional deficiencies. They believe these deficiencies may develop rather rapidly, especially in the presence of persistent vomiting and the resultant lack of absorption of food. Their patients were given liver extract and yeast and in a few days the symptoms were relieved.

Winans and Perry[23] believe that the polyneuritis associated with the vomiting of pregnancy is a deficiency disease. They recommend that liver extract be given intramuscularly daily from the beginning, since this provides a simple method of administration of the vitamin B complex.

They state that the response to intramuscular liver extract in many cases is as gratifying as that seen in the deficiency anemias. The occurrence of an identical syndrome in one of their cases in which the patient merely thought she was pregnant caused these authors to suggest that there is no special toxemia responsible for these symptoms.

Day[24] and his associates gave young albino rats a diet deficient in flavin and examined their eyes at frequent intervals with the ophthalmoscope. Of sixteen control animals receiving the deficient diet without supplement, thirteen developed cataract at an average time of fifty-two days. The cataract proceded to maturity in twelve of these rats, at an average time of sixty-seven days. The average survival was seventy-four days. When early cataractous changes were evident, twenty-five rats were given intramuscular injections of riboflavin in doses of 120 micrograms twice a week. The animals rapidly increased in weight, new hair appeared on those rats with alopecia, and keratitis cleared up slowly. In eleven of these rats cataract was arrested in both eyes. In each of six other rats the cataract proceeded to maturity in one eye, but its progress was definitely arrested in the other eye. The cataract proceeded to maturity in both eyes of two rats. Six rats were found to have clear lenses in both eyes after the keratitis cleared up. It is thus apparent that the progress of cataract development was arrested by riboflavin administration in seventeen of nineteen animals exhibiting cataract. These data furnished additional evidence that flavin is the cataract-preventive vitamin.

Vitamin C

Vitamin C (ascorbic acid or cevitamic acid) is known as the antiscorbutic vitamin. It is water soluble and is believed essential for normal condition of endothelial cells. It favors good teeth development, improves appetite, stimulates growth, is essential to tissue respiration and glandular functions. It controls collagen gelation, protects the vascular system and is involved in the defense mechanisms against bacterial toxins.

Mild symptoms of deficiency are marked by tender joints, retarded growth, defective teeth, poor resistance to infections, weakness, restlessness, digestive disturbances, weakened blood capillaries, poor lactation, lesions in endothelial tissue, headaches, poor bone knitting, gastric ulcers and anemia. Extreme deficiency produces scurvey, hemorrhages, swollen joints, paralysis, swollen gums, loose teeth, beaded ribs, fragile bones, sterility, respiratory and intestinal infections, lesions in bone marrow and teeth, hypertrophy of adrenals and atrophy of musculature.

Vitamin C is distributed in the following foods[2] (this table is based upon the vitamin C content in the fresh, raw state, or when cooked carefully. Open kettle cooking, wilting, etc., may readily destroy most of the vitamin C value of foods, except acid juices):

Excellent Sources

Asparagus	Gooseberries	Limes	Spinach
Cabbage	Grapefruit	Orange juice	Strawberries
Cauliflower	Kale	Peas (green)	Tangerines
Cress	Kohl-rabi	Peppers	Tomatoes
Collards	Lemon juice	Pineapple	Turnip Greens
Currants	Lettuce	Radishes	

Good Sources

Apples	Carrots	Peaches	Rutabagas
Bananas	Celery	Potatoes	Sprouted grain
Beans	Chard	Raspberries	Turnips
Brain	Liver	Rhubarb	Watermelon
Brussels Sprouts	Onions		

Vitamin C or cevitamic acid has been found in the lens and aqueous by numerous investigators; most all of whom found that cevitamic acid was absent or diminished in quantity in the aqueous of cataractous and aphakic eyes. According to these investigators, the quantities of cevitamic acid are surprisingly large when compared with the amounts in other body tissues and fluids. Müller and Buschke[25] give the values of vitamin C content of the human lens and aqueous as 30 and 12 mg. per hundred c.c.s. respectively. Bellows[26] checked the work of Müller and Buschke and found the cevitamic acid concentration much lower in cataractous than in normal subjects. On the basis of his results he suggests that vitamin C be given to all subjects with incipient cataract in order to observe its influence.

The origin of cevitamic acid in the lens and aqueous has not yet been determined. The fact that the concentration in the aqueous is about twelve times higher than that in the blood plasma rules out a simple filtration process. Several possible explanations have been offered; one group of investigators believe that selective filtration of vitamin C occurs in various parts of the body. A second possible explanation is that dextrose reacts with cystine in the lens to form cevitamic acid and cysteine. Because of the permeability of the lens capsule, the cevitamic acid escapes from the lens into the aqueous. A third explanation is that cevitamic acid occurs in three forms, namely, a reduced form; a reversibly oxidized

form, which can be reduced by hydrogen sulfide; and an irreversibly oxidized form, which cannot be reduced. According to this theory a lens in vitro in aqueous exerts a preserving action on the vitamin C content of the aqueous. A corresponding amount of aqueous without a lens shows a marked loss in its cevitamic acid content at the end of five hours. It has been demonstrated that the vitamin C in normal aqueous is wholly in the reduced form, while in an aphakic eye the reduced form tends to disappear and the reversibly oxidized form appears. Supposedly then the cevitamic acid reaches the aqueous from the blood stream. There the reversibly oxidized form by means of dehydrogenaton becomes reduced and thus plays a part in the normal oxidation-reduction processes of the lens. In this way the reversibly oxidized form is continually being changed into the reduced form and a piling up of this substance occurs in the aqueous. The absence or dimunition of cevitamic acid in the aqueous and in the lens of cataractous eyes and in the aqueous of aphakic eyes brings forth the question of the relationship of vitamin C and cataract.

Weinstein[27] explains the formation of cataract with developing age by asserting that the permeability of the blood vessels is changed in sensility so that the transport of certain crystalloids (sugar, vitamin C) into the aqueous is prevented, and in association with this the internal respiration of the lens diminishes, which leads to progressive cloudiness of the lens.

Nakamura and Nakamura[28] believe that it seems justified, on the basis of their experiments, to assume close relations between the amount of vitamin C present in the eye and the pathogenesis of cataract. Bellows[29] confirms the report of Mitchell[30-31] and others that galactose in the diet of the albino rat produces cataract. He states that galactose in some way causes a loss of the sulfhydryl content of the crystalline lens. As a result of this the internal oxidative system of the lens reaches a stage where it is insufficient to support the life of the tissues. Death of the lens fibres occur, with resultant opacification. Cystine and to a lesser extent, vitamin C delay the onset of this type of cataract.

Gala and Melka[32] investigated and tabulated the ascorbic acid content of the aqueous humor of 165 human eyes. They found it to vary considerably. It diminished in winter because of a lack of the vitamin in the food and decrease in sunlight. Normal eyes contain on the average 4, inflamed eyes 3, old cataractous eyes 2.6, incipient cataractous eyes 3.2 mg. of ascorbic acid per 100 c.c. Decrease of ascorbic acid in cataractous

eyes is not the rule, and it cannot be considered as the causative agent in formation of cataract according to these authors. They found that the aqueous humor of seven eyes with mature cataract had as much, sixteen eyes had less and eleven eyes had more ascorbic acid than eyes with incipient cataract. Two aphakic eyes had a greater and two had a lesser amount of ascorbic acid than the corresponding eye with normal lens or cataract.

According to Bakker[33] ascorbic acid is present in the lens in relatively high amount, varying at different ages and according to the food supplied. He believes that the transparency of the lens is not as directly dependent on its cevitamic acid content as the literature on its relation to cataract would suggest. He states that its decrease or absence in an opaque lens cannot be regarded as a factor in the causation of cataract, that it is not always diminished in cataract and that it may be entirely absent as, in scurvey, without any signs of cataract. According to him, cevitamic acid, while of importance in lens metabolism, it is not indispensable as even in its absence the intake of oxygen in the lens may remain unchanged.

Hawley and Pearson[34] conducted experiments on sixteen patients and determined that there is a definitely decreased amount of cevitamic acid in the cataractous lens. They found no correlation between age and the content of vitamin C in the lens, nor did they find any correlation between the type of abnormality in the lens and the level of vitamin C. They believe that although an adequate diet cannot fail to be more effective in the preservation of normal function than one deficient in any respect, and the inclusion of sufficient amounts of food rich in vitamin C is advantageous, and in spite of the contrary evidence of other investigators, the low content of vitamin C in the lens is probably the result of cataractous changes rather than the underlying cause.

The Council on Pharmacy and Chemistry and the Council on Foods of the American Medical Association have issued the following on vitamin C:

"Definite claims for the therapeutic value of vitamin C should be permitted only in relation to scurvy until further clinical or experimental evidence has substantiated its usefulness in other states.

"Vitamin C is acceptable for the correction and prevention of scurvy. This effect has been established experimentally and by clinical investigation.

"It may be permissible under certain conditions to refer to the therapeutical value of vitamin C in early and latent scurvy. Convincing clinical evidence has established that this state does occur. It would be well to emphasize the fact that the diagnosis rests, however, on the basis of roentgenologic evidences in the long bones, and possibly failure to excrete an optimum amount of cevitamic acid in the urine.

"Dental caries, pyorrhea, certain gum infections, anorexia, anemia, undernutrition and infection alone are not in themselves sufficient indications of vitamin C deficiency but according to experimental and clinical investigation they may be concomitant signs of vitamin C deficiency. Therefore, it would be permissible to accept the claim for the therapeutic value of vitamin C in these symptomatic conditions *only when* it is definitely stated that they are the consequences of a deficiency or suboptimal amount of vitamin C or when there is a pathologic interference with assimilation of the amount necessary for the preservation of health.

"Unless more convincing evidence is present than is now available, no claim referable to the anti-infective effect of vitamin C will be recognized. Secondary infections are characteristic of disturbances of nutrition, particularly in all vitamin deficiency diseases. It has not been established that vitamin C has a therapeutic effect which directly influences associated secondary infections in scurvy.

"Because vitamin C is a dietary essential, its administration in concentrated form is of value in conditions where difficulty in introducing orally or utilizing ordinary foods in the usual way is encountered. Vitamin C (cevitamic acid) is accepted as an essential dietary constituent in infant feeding but it should not be accepted for use in the treatment of diseases except according to the conditions mentioned above. It is generally administered in the form of vitamin C carrying juice. When there is persistent vomiting, diarrhea, or any other condition preventing its utilization in proper amounts it would be permissible to give vitamin C parenterally in concentrated form as sodium cevitamate.

"Concentrates of vitamin C offered for clinical use must state the potency in terms of the International unit. The International unit for vitamin C which was formerly defined as the vitamin C activity of 0.1 cc. of lemon juice, has now been defined as the vitamin C activity of 0.05 mg. of l-cevitamic acid (ascorbic acid). This is the quantity of l-cevitamic acid usually found in 0.1 cc. of lemon juice.

"The claim that a food is valuable because of its vitamin C content should be permitted only if it provides a daily intake of at least 250 units of vitamin C.

"A reasonable general statement regarding allowable claims for vitamin C would be as follows: An optimum amount of vitamin C should be supplied at all ages for its therapeutic value in preventing the development of acute or latent scurvy. Claims for the therapeutic value of vitamin C may be accepted when the agent is described as a corrective measure for scurvy due to a demonstrable absence or a suboptimal quantity in the diet or in cases in which it is definitely known that there is interference with the absorption of an optimal amount. Advertising of vitamin C for such symptoms as failure to gain in weight or stoppage of growth, anorexia, anemia, infections, symptoms referable to the central nervous system or hemorrhagic conditions cannot be accepted unless it is definitely stated that the symptoms are referable to a demonstrable deficiency of vitamin C."

Vitamin D

Vitamin D or calciferol is known as the anti-rachitic vitamin. It is soluble in fats and is formed in human and animal bodies when the skin is exposed directly to the sunlight or ultra-violet light; it is also formed by the irradiation of ergosterol or cholesterol. It regulates the metabolism of lime and phosphorous and is essential to normal bone growth and tooth development. It favors good body form and aids in controlling the blood calcium level.

Mild deficiency symptoms are poor assimilation of lime and phosphorous, poor deposition of lime and phosphorous in the teeth and bones, restlessness, lack of vigor, bow legs, low blood calcium, low blood phosphate, predisposition to dental caries and high blood phosphatase. Extreme deficiency produces rickets, softened bones, enlarged joints, curved spine, osteoporosis, beaded ribs, retarded growth, severe loss of lime and phosphorous and lesions in the bones and teeth.

Vitamin D is distributed in the following foods[2]:

Excellent Sources

Cod liver oil	Irradiated foods	Salmon oil
Halibut liver oil	Liver	Sardine oil

Good Sources

Beef fat	Cream	Ice cream	Salmon
Butter	Egg yolk	Mutton fat	Sardines

Blackberg and Knapp[35] have reported ocular findings in puppies receiving a diet deficient in vitamin D and low in calcium. There was observed prominence of the eyeball, widening of the palpebral fissure, episcleral injection, primary ectasia of the cornea, deepening of the anterior chamber and swollen, muddy iris. Lenticular opacities were followed from the incipient stage to the mature cataract. Fundus examination revealed pallor and irregularity of the nerve heads, attenuation of the retinal arteries, dispersion of the pigment of the tapetum cellulosum, and an occasional hemorrhage. These changes resemble very closely and were often apparently identical with certain ocular diseases in man, the etiologies of which were unknown. They believe there is a possibility that the observed weakening of the entire fibrous tunic which was observed and which was dependent upon a deficient vitamin D, low calcium intake, may be an etiological factor in myopia. They are at the present time engaged in making observations of patients with myopia and primary corneal ectasia from this point of view. Encouraging results have been obtained from the administration of medication designed to rectify the deficient diet.

Knapp and Blackberg[36] have also reported the consistent production of keratoconus in dogs fed a vitamin D deficient, low calcium diet. Knapp[37] reports twelve cases of keratoconus in man treated with vitamin D in the form of viosterol, and calcium in the form of mineral mixture tablets. He claims gratifying results with vision improved subjectively and a reduction of the keratoconus objectively, in all cases.

Laval[38] reports having studied 48 myopic patients for from three to six years. In every case the patients were taking vitamin D and milk continuously. In every case there was an increase in the amount of myopia. In some cases the increase was only one diopter; in others it was as much as 2.5 diopters. In no case did the myopia decrease. Accordingly Laval disagrees with others who say that treatment with vitamin D and calcium helps patients who have myopia.

The Council on Pharmacy and Chemistry and the Council on Foods of the American Medical Association have issued the following on vitamin D:

"Vitamin D is recognized as a specific in the treatment of infantile rickets, spasmophilia and osteomalacia, diseases which are manifestations of abnormal calcium and phosphorous metabolism. Vitamin D is valuable in the prevention as well as in the curative treatment of these

diseases. Complications such as renal insufficiency or glandular malfunction may preclude normal response to vitamin D therapy. During acute infections, especially of the gastro-intestinal tract, vitamin D may prove ineffective because poorly absorbed."

"Direct exposure of the skin to ultra-violet light from the sun or from artificial sources results in the formation of vitamin D within the organism but the Council cannot recognize statements or implications that vitamin D has all beneficial effects of exposure to sunshine."

"There is clinical evidence to justify the statement that vitamin D plays an important role in tooth formation and maintenance of normal tooth structure, but there is no warrant for the claim that adequate vitamin D intake will insure normal tooth structure or that adequate vitamin D intake will prevent dental caries."

"Animal experimentation has shown that correction of an inadequate intake of vitamin D results in the more economical utilization of calcium and phosphorous and also that the undesirable effects of improper ratios of calcium and phosphorous in the diet can largely be overcome by normal intake of vitamin D. The importance of these observations in their application to man is not entirely apparent because of the lack of adequate clinical evidence showing the availability of different forms of calcium and phosphorous, but it may be stated that vitamin D has a favorable influence on calcium and phosphorous metabolism."

"The vitamin D requirement is greatest during the period of infancy. Beyond the age of infancy the exact vitamin D requirement of man under any specified conditions is not known but it appears that the requirement during pregnancy and lactation is increased."

Vitamin E

Vitamin E (*a*-tocopherol) is known as the anti-sterility vitamin. There is little experimental evidence that a deficiency ever occurs in the diet of human beings. This vitamin is so widespread and stable that a significant deficiency in human diets is unlikely. The data given here is based upon studies with white rats.

Mild symptoms of deficiency are low fertility, poor lactation and impaired placental function. Extreme deficiency symptoms are marked by sterility, the male germ cells fail to develop, the female ovum is resorbed before growth and there is placental failure. Vitamin E is distributed in the following foods:

Excellent Sources

Corn oil Lettuce (green) Hempseed oil Wheat germ oil

Good Sources

Nearly all green leaves and whole grain.

Conclusions

It is evident from a review of the most recent literature on the subject of vitamins that they play an important part in the therapy of ocular diseases. Vitamin A has been shown to be definitely useful in the treatment of corneal lesions and in the correction of hemeralopia due to avitaminosis A. It has given good results in the treatment of various corneal lesions when administered orally as well as when applied topically —either in the form of cod liver oil or in the more concentrated form of carotene.

In view of the definite relationship between dark adaptation and avitaminosis A it is evident that the eye practitioner is responsible for the detection of the deficiency, especially in its earlier stages. It is suggested that all patients manifesting excessive sensativity to light or difficulty in driving at night should have their dark adaptation determined by one of the office type instruments designed for that purpose (i.e. the Biophotometer or the Adaptometer).

There seems to be sufficient evidence to justify the use of vitamin B_1 in the treatment of various nerve involvements such as herpetic keratitis and herpes zoster, as well as for its use in toxic amblyopia due to alcohol and tobacco.

Deletion of vitamin B_2 from the diet of experimental animals has resulted in the production of cataract, but there is insufficient evidence to support the clinical use of this vitamin in the treatment of cataract.

Innumerable research workers have determined the presence of vitamin C or cevitamic acid in the lens and aqueous of normal eyes and a decidedly diminished amount in the eyes of cataractous patients. Present opinion, however, tends to the belief that this lowering of the normal cevitamic acid level is the result rather than the cause of cataract.

There is evidence that a deficiency of vitamin D results in a weakening of the cornea with resultant ectasia or keratoconus. Patients suffering from this condition have responded to treatment with vitamin D in the form of viosterol together with calcium in the form of mineral

mixture tablets. There is insufficient evidence to support the theory that vitamin D deficiency is a cause of myopia.

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BIBLIOGRAPHY

1. Report of League of Nations Commission on Biological Standardization, No CH 1055 (1), 1932.

2. Nutritional Charts, Research Department, H. J. Heintz Company, 5th edition, Pittsburgh, 1937.

3. Wolbach, S. B.: "The Pathological Changes Resulting from Vitamin Deficiency," Journal A. M. A., 108:7-12 (January 2), 1937.

4. Jeans, P. C., Blanchard, E., and Zentmire, Z.: "Dark Adaptation and Vitamin A," Journal A. M. A., 108:451-58 (February 6), 1937.

5. Scullica, F.: "Avitaminosis and the Syndrome of Xerophthalmia," Ann. di Ottal. 63:721 (October), 1935.

6. Jeghers, H.: "The Degree and Prevalence of Vitamin A Deficiency in Adults," Journal A. M. A., 109:756-61 (September 4), 1937.

7. Viallefont, H., and Diacono, E.: "The Role of Vitamins in Ophthalmology," Arch. d'Opht., 52:723 (October), 1935.

8. Rice, C. E., Sory, R., Smith, J. E., Faed, P. E., and Drake, A. A.: "The Effect of Diet and Vitamins on Trachoma," Am. J. Ophth., 17:735 (August), 1934.

9. Rinaldi, S.: "Vitamins A and D in the Local Treatment of Corneal Lesions," Ann. di ottal. e clin. ocul., 64:505 (August), 1936.

10. Heinsius, E.: "Experimental Researches on the Influence of Vitamin A Upon the Regeneration of the Corneal Epithelium," Arch. f. Ophthal., 136:103.

11. Yudkin, A. M.; Orten, A. V.; Smith, A. H.: The Production and Cure of Ocular Disturbances in Adult Albino Rats by Adjustment of Vitamin A. Amer. J. Ophth. 20:1115 (November), 1937.

12. Heinsius, E.: Concerning use of Ointment Containing Vitamin A in Ophthalmology. Munch. Med. Klin. 84:936 (June), 1937.

13. Jeghers, H.: Night Blindness as a Criterion of Vitamin A Deficiency. Ann. of Int. Med. 10:1304 (March), 1937.

14. Fai, M. C.: Hypodermic Injections of Carotene in the Treat-

ment of Phlyctenular Conditions and Vitamin A Deficiency Diseases in Ophthalmology. Chinese Med. Jour. 50:453 (October), 1936.

15. Federici, E.: A and D Vitamins in Corneal Reparative Processes. Ball. d'Ocul. 10:357 (April), 1937.

16. Jour. Amer. Med. Assoc., 110:578 (February 19), 1938.

17. Harrow, B.: Biochemistry, W. B. Saunders Company, Philadelphia, 1938, p. 139.

18. Nitzulescu, J. and Triandaf, E.: "Treatment of Herpetic Keratitis with Vitamin B," Brit. J. of Ophth., 21:654 (December), 1937.

19. Vorhaus, M. G.: "The Present Evaluation of Vitamin B Therapy," Amer. J. Digest. Dist. and Nutrit., 3:915 (February), 1937.

20. Yudkin, A. M.: Vitamins in Treatment and Prevention of Ocular Diseases. Arch. of Ophth. 19:366 (March), 1938.

21. Carrol, F. D.: Analysis of Fifty-five Cases of Tobacco-Alcohol Amblyopia. Arch. of Ophth. 14:421 (March), 1935.

22. Wagener, H. P. and Weir, J. F.: Ocular Lesions Associated with Post Operative and Gestational Nutritional Deficiency. Amer. J. Ophth. 20:253 (March), 1937.

23. Winans, H. M. and Perry, E. M.: Deficiency Polyneuritis. South. Med. Jour. 29:309 (March), 1936.

24. Day, P. L.: Darby, W. J., and Cosgrove, K. W.: Arrest of Nutritional Cataract by Use of Riboflavin. Jour. of Nutr. 15:83 (Jan.), 1938.

25. Müller, H. K. and Buschke, W.: Arch. f. Augenh. 108:368 and 592, 1934.

26. Bellows, J.: Biochemistry of the Lens. Arch. of Ophth. 15:78. 1936.

27. Weinstein. P.: The Role of Vitamin C in the Oxidation Process of the Lens. Arch. f. Augenh. 109:221. 1935.

28. Nakamura, A. and Nakamura, O.: The Vitamin C Content of the Aqueous and Lens in Man. Arch f. Ophth. 134:197 (Aug.), 1935.

29. Bellows, J.: Biochemistry of the Lens. Arch. of Ophth. 16:762. 1936.

30. Mitchell, H. S. and Dodge, W. M.: Journal of Nutrition. 9:37. 1935.

31. Mitchell, H. S.: Proceedings Soc. Exper. Biol. & Med. 32:971. 1935.

32. Gala, A. and Mělka, J.: The Vitamin C Content of the Aqueous Humor in Normal and Pathologically Changed Eyes. Arch. f. Augenh. 109:726. (June), 1936.

33. Bakker, A.: On the Importance of Ascorbic Acid for the Metabolism of the Lens. Arch. f. Ophth. 136:166.

34. Hawley, E. and Pearson, O.: Vitamin C and Its Relation to Cataract. Arch. of Ophth. 19:959 (June), 1938.

35. Blackberg, S. N. and Knapp, A. A.: The Influence of the Vitamin D-Calcium-Phosphorous Complex in the Production of Ocular Pathology. Amer. J. of Ophth. 20:405 (April), 1937.

36. Knapp, A. A. and Blackberg, S. N.: Ocular Changes Accompanying Disturbances of Calcium-Phosphorous Metabolism. Arch. Ophth. 11:665 (April), 1934.

37. Knapp, A. A.: Vitamin D Complex in Keratoconus. Jour. A. M. A. 110:1993 (June 11), 1938.

38. Laval, J.: Vitamin D and Myopia. Arch. Ophth. 19:47 (Jan.) 1938.

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THE MEDICAL QUACK IN THE OCULAR FIELD

Spooner,[1] writing on quackery makes the statement that the average doctor can be regarded as an ophthalmic quack. This statement may come as a shock to some, though it will come as no shock to most medical men and optometrists. To be sure, most physicians attempt little or no eye work. By shunning this type of practice they therefore escape the criticism which is certain to be leveled at them when or if eye work is attempted. Medical men as a whole realize that the training they have received in medical schools no more qualifies them to do eye work than it qualifies them to practice dentistry. Medical men realize that their training in no way qualifies them to do *any* sort of eye work, and they further realize that without two or preferably three additional years of specialized graduate training, that they are not educationally fitted to do the technical work required of trained eye specialists. Because of this fact and because of the justifiable criticism which is sure to come their

[1] Dioptric Review. p. 105. June, 1938.

way, most reputable physicians ignore the eye field leaving this to the three groups now engaged in ophthalmic practice. These groups are (1) the numerically very small group of properly trained medical specialists. All men enjoying an optometric training in addition to their medical background. (2) The very large group of professionally trained eye men, licensed by each state as optometrists, and (3) that group of medical men, who have taken a three or four month short course in some small private school or hospital and then set themselves up as specialists in the eye, ear, nose and throat field. These latter physicians constitute the largest single group of professional people engaged in quackery in America today.

Now first, just what is meant by the word quackery as used in the foregoing paragraph? Here the word is used to designate the actions of that third group of short course medical eye specialists who engage in the practice of eye work and who are, on the whole, derogatory to it. In particular, that type of sharp practice which consists of allowing considerations of private gain, not merely to override, but to exclude all others. The writer refers to the actions and practices of these short course medical eye specialists as quackery of the worst sort because these men hold themselves out to the public as fully qualified medical eye specialists, and accept cases and fees on the basis of a training they do not possess. This is quackery, and it is done for private gain.

It is obvious that under existing conditions, private gain is the primary and strongest motive in any profession, why therefore, must the writer stigmatise the frank emphasis of this point as quackery? Many really ethical optometrists and medical men, it is to be feared, could not meet this question other than by indignation or by some flowery pronouncement to the effect that it "pays to be ethical." But on these grounds the case is lost to the quack for it admits to the discussion the principle that gain is to be the criterion of merit. The writer must therefore present a clearer and sounder idea of the case against quackery than that.

Now the need for a code of professional conduct rests upon the following. Economically speaking, the individual optometrist, because of his license as an eye specialist, has a vested interest in the prevalence and spread of faulty vision; just as the general practitioner of medicine has, because of his license as a physician, a vested interest in the prevalence and spread of ill health. But economics is only one of the many aspects of Man, and the economic man is an abstraction only, inasmuch

as the real man is also religious, political, social, ethical and a creature of morals, and as men are, so must be their institutions. Therefore, no professional group can be successful wholly as a mercenary society. Therefore also, the purpose of professional codes is to supply the ethical balance to the economic aspects of professional life. Without this the stressing of the economic side soon becomes intolerable.

It is said that there is honor amongst thieves. If so, this then becomes the lowest known example of a professional code. Lowest, because this sort of "honor" is far removed from the ideals of the community as a whole. The more nearly the code of any profession coincides with the ideals of society as a whole, the higher that professional code may be said to be. Hence, public interest is the criterion of professional good.

The quack in his practice entirely disregards this essential social aspect of his work. In fact he may, due to his ignorance or his indifference, actually work against the very principals set up by the really trained and skilled members of the profession to which he professes to belong. And in his ignorance or utter indifference as to what constitutes proper professional training in his field he becomes a menace to both the public and to the skilled members of his profession.

It is obvious that any given segment of society can tolerate just so many thieves and rogues. Given an over supply of these individuals at any one time and the general structure of society will be torn apart. This being true of society as a whole, we find it equally true of all professions. The general mass of any group of professional practitioners must be, first, so well trained and educated as to be competent in their general daily tasks. Second these practitioners must be so professionally stimulated as to want to keep abreast of the newer technical developments in the field in which they function and third, they must be motivated by a real desire to refrain from sharp practice. When any section of a profession becomes overrun with practitioners who fail to measure up to these qualifications the general structure of that profession is threatened.

The individual who is anti-social-minded sets himself apart from the general run of persons because he feels free to prey upon the most of us in some manner considered contrary to the best interests of the community as a whole. The anti-social-minded professional man no doubt justifies his entrance into a professional field in which he holds no adequate educational qualifications on the same ground. Both feel that what they are doing is all right as long as they can "get-away-with-it."

The specific species of quackery mentioned at the start of this paper is the type encountered by the public when dealing with medical men who have entered the field of eye work after taking some very short and inadequate course of training in this highly specialized vocation. As the writer has said, the very best medical courses of today make no attempt to train the physician in matters of ocular care and physicians who wish to properly prepare themselves to do ocular work find it necessary to spend from two to three years in graduate schools to get the optometric background needed to supplement their medical training so as to really properly qualify them as medically trained eye specialists. Unfortunately, but few are willing to do this. The majority of medical men entering the eye field today, do so after short courses, ranging from a few weeks in duration, to courses of not to exceed eight months. The average would perhaps be somewhere around three to four months.

While it is admitted that the practitioners medical training gives him a good background upon which to add further knowledge in the specialized eye field, the writer believes that irrespective of the students general mental qualifications and no matter how carefully the student applies himself, it is educationally impossible to adequately cover the subject matter involved in a study of the refractive and pathological aspects of eye work in these short periods just mentioned. And when it must be understood that in these short courses the student-physician is presumed to also get specialized training in the field of nose, throat and ear work as well, one marvels at the cupidity of the medical graduate who attempts it. Men so trained are, to say the least, very, very inadequately prepared and as such are open to the charge of practicing in a manner as to menace the general ocular well-being of the public at large. Nothing less than the nation's sight is at stake and this type of quackery on the part of these short course medical oculists must be abolished.

This question is one of the most vital facing the optometrists and medical men of the country today. The practice of entering the eye field by the back door method supplied through the short course to physicians is growing. More and more graduate physicians are entering the practice and this is one of the serious major questions which will have to be adjudicated in the interest of better vision for the public. The reputable optometrist and the qualified physician are both suffering from this practice inasmuch as both groups are being brought into ill repute by these unqualified medical eye specialists. The public judging all eye men by

the poor work done by these short course eye, ear, nose and throat practitioners.

From a practical standpoint this is primarily a medical question. The guilty practitioners are all holders of medical degrees and are all licensed by medical examining boards. Licensed, to be sure, not to do eye work, but rather licensed as general practitioners of medicine. Unlike the optometrist, these men have taken no qualifying examination in ocular work. They have in *no* way proven themselves qualified to practice in the specialty into which they have projected themselves, yet under existing legal conditions the examining boards which license the optometrist are powerless to interfere. It therefore becomes the duty of the medical examining boards to exert pressure to clean up this mess before it drags all medical practitioners down with it.

The optometrists have placed their educational house in order. Present day four-year full-term college courses in this specialty for optometrists assure the public the services of trained professional men to diagnose eye abnormalities and to prescribe for refractive errors. Optometrists have always worked with physicians in the closest and most harmonious manner possible and it is their wish to continue to do so. The many years of cordial relationship between the two professions will mean little, however, unless medicine officially takes a hand in the correction and elimination of the major chicanery now disturbing that profession, that being the present day practice on the part of the inadequately trained medical quack in the ocular field. A practice which must be made impossible in the future in the interests of public safety.

Carel C. Koch.

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PRINCIPLES AND PRACTICE OF PERIMETRY. Luther C. Peter, M.D., F.A.C.S. Fourth Edition. Published by Lea & Febiger, Washington Square, Philadelphia, Penna. 331 pages, illustrated. $4.50, 1938.

Peter presents in this volume, as in his previous editions, his course in perimetry as given at the University of Pennsylvania. The book opens with a summary of the anatomy and physiology of the visual pathway and leads naturally to a discussion of methods of study, instrumentation and technique. A study of the character and variations of normal fields paves the way to the recognition of digressions from the normal. Under

special pathology the characteristic changes are discussed in order from diseases of the retina, choroid and nerve head through the visual pathways to the cortical or higher visual centers of the brain. It is to be regretted that the work of the optometrist Brombach was not included by Peter as Brombach has in recent years added much to the science of field charting. Carel C. Koch.

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MEDICAL OCCUPATIONS. Lee M. Klinefelter. Published by the E. P. Dutton & Company, Inc., 300 Fourth Ave., New York, N. Y. Illustrated. 287 pages. Cloth, $2. 1938.

A narrative which takes the reader into the offices and schools of the various branches of the healing arts. This is a book written for the student in the senior high school and presents something regarding the work and future of each of the professions mentioned. While in no sense a text, it does nevertheless cover the subject in a way that is interesting and sufficiently complete as to give the reader a background for additional study should he prove interested. C. C. K.

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CATARACT, ITS PREVENTION AND TREATMENT. Neville Schuler, Opt.D., F.I.O., R.O. Published by the author, Capitol Block, New Toronto, Ontario, Canada. 90 pages. Cloth, $2.50. 1938.

A thorough and frequent correction of all refractive error, the use of absorption glass which excludes all of the infra-red radiations and orthoptics are the three preventive and corrective optometric measures suggested by Schuler in cases of incipient senile cataract. This monograph touches on the etiology, diagnosis, prognosis and treatment of cataract. None of its chapters are complete and none of them include a bibliography. This work, containing as it does the germ of a very good idea, should be entirely rewritten to include the wealth of scientific data already assembled on this subject. C. C. K.

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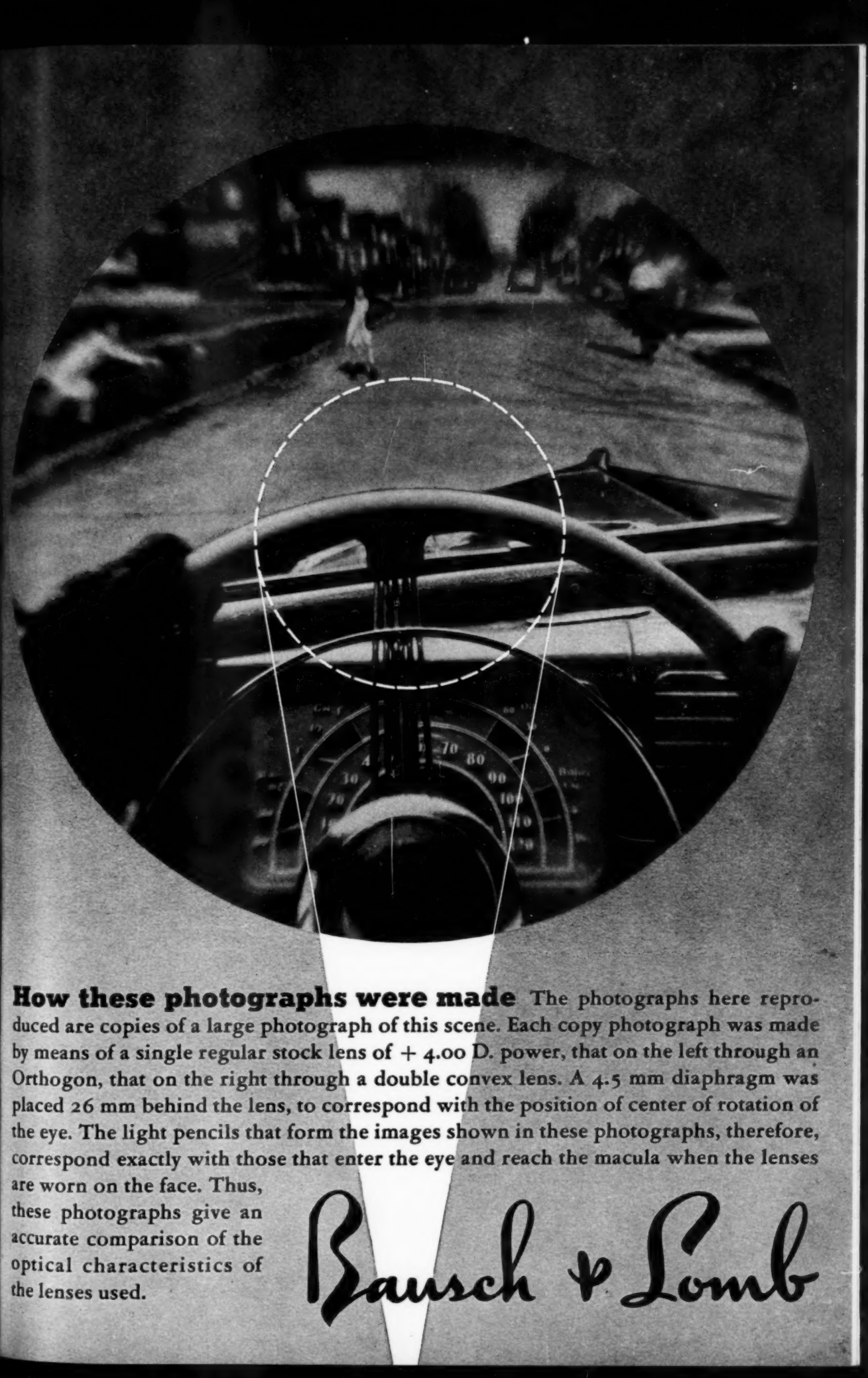

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